NON-PUBLIC?: N
ACCESSION #: 9305140179
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Nine Mile Point Unit 1 PAGE: 1 OF 5

DOCKET NUMBER: 05000220

TITLE: Reactor Scram on Intermediate Range Monitor High Neutron Flux Caused by Electrical Noise
EVENT DATE: 04/13/93 LER #: 93-006-00 REPORT DATE: 05/10/93

OTHER FACILITIES INVOLVED: N\A DOCKET NO: 05000

OPERATING MODE: N POWER LEVEL: 001

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Mr. Kenneth Sweet, Manager TELEPHONE: (315) 349-2462
Technical Support NMP1

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On April 13, 1993, at 1810 hours, Nine Mile Point Unit 1 (NMP1) received an automatic reactor scram initiation signal resulting in a full scram. While performing N1-IPM-092-231, "IRM Monitor Gain Adjustment to Reactor Power," a spurious Intermediate Range Monitor (IRM) high-high neutron flux trip was received when 17 IRM was taken out of bypass. At the time of the event, the plant was being started up with the mode switch in the "STARTUP" position and the reactor at the point of adding heat, reactor pressure was atmospheric and reactor temperature was 140 degrees Fahrenheit.

The root cause of this event was determined to be electrical noise generated by energizing/de-energizing the IRM bypass relays.

Immediate operator actions included commencing scram recovery activities.

Additional corrective actions included determining the cause for the IRM spike and installing a noise suppression circuit to correct the cause.

END OF ABSTRACT

I. DESCRIPTION OF EVENT

On April 13, 1993, at 1810 hours, Nine Mile Point Unit 1 (NMP1) received an automatic reactor scram initiation signal resulting in a full scram. At the time of the event, the plant was being started up with the mode switch in the "STARTUP" position and the reactor at the point of adding heat, reactor pressure was atmospheric and reactor temperature was 140 degrees Fahrenheit.

During the startup, Intermediate Range Monitor (IRM) channel 16 was bypassed because it has a history of spiking. When it was required to perform N1-IPM-092-231, "IRM Monitor Gain Adjustment to Reactor Power," IRM channel 16 was observed for a steady reading then unbypassed. IRM channel 17 was bypassed and the test performed. At the moment the operator unbypassed IRM channel 17, the IRM high-high neutron flux trip initiated causing a full reactor scram. The operators involved noticed high level indicating lights for IRM channels 13 and 16 signaling that these two IRM channels had caused the scram. The process computer was checked and channel 16 indicated tripped. Channel 13 showed spiking on the chart recorders, but the computer did not register level above the trip setpoint.

The Control Room operators commenced scram recovery procedures. Reactor water level and pressure remained constant during the event. Two control rod position indicators failed after the scram. They were repaired and indicated the rods were fully inserted.

II. CAUSE OF EVENT

A simplified root cause investigation was performed in accordance with Nuclear Interfacing Procedure NIP-ECA-02, "Root Cause Evaluation." The root cause of the scram was an electrical noise spike generated by the bypass relay coils and transmitted via the instrument ground bus to the IRM channels. The noise signal was large enough to cause IRM channel 13 and 16 to trip on high-high neutron flux level.

Operator observations during and after the scram had determined that the scram had occurred simultaneously with the unbypassing of IRM channel 17. An oscilloscope was connected to each input of IRM channels 13 and 16

then the bypass switches were cycled. A noticeable spike was evident for both channels indicating the bypass switch circuits were inducing the noise. During the process of cycling the bypass switches, the downscale alarms on several other IRM channels cleared and re-alarmed indicating the noise affected a signal path common to all the IRM channels. Further investigation determined that the noise was generated by the bypass relay coil energizing and de-energizing.

When a coil energizes or de-energizes, it builds or releases energy quickly. This change in electrical energy induced voltages on the ground bus. The ground bus connects all the IRM channels, therefore any change in electrical potential affects them all.

III. ANALYSIS OF EVENT

This event is reportable in accordance with 10 CFR 50.73 (a)(2)(iv), which requires the licensee to report "any event or condition that resulted in a manual or automatic actuation of any Engineered Safety Feature (ESF), including the Reactor Protection System (RPS).

The IRM rod block and scram functions are utilized for reactor protection during startup, shutdown, and low power operations. Since these trips are bypassed when the mode switch is in the "RUN" position, the scram described in this LER would not occur during full power operation. Because the IRM high-high neutron flux trips were spurious, no actual over power event occurred. The full reactor scram was a conservative response to the electrical noise signal.

There were no safety consequences as a result of this event. The reactor scram was bounded by the NMP1 Final Safety Analysis Report (FSAR), Section 15, "Safety Analysis." There were no systems or components inoperable during the event that could have contributed to the event. The reactor scram posed no safety consequences to the health and safety of the general public or plant personnel.

IV. CORRECTIVE ACTIONS

The immediate corrective actions were for operators to perform all scram recovery actions, place the plant in a stable condition, and determine the cause for the reactor scram.

Additional corrective actions included:

1. A Deviation/Event Report (DER 1-93-0957) was generated to track the

event, the LER, and corrective actions.

2. A Work Order (WO 92-02160-00) was written to plan and implement the IRM troubleshooting effort. This effort identified the bypass relay coils as the cause.

3. A resistance/capacitance (RC) network was attached across the bypass relay coils in accordance with Temporary Modification 93-0019. The RC network dissipates the electrical energy more slowly which significantly reduces the amplitude of the noise spike. Retest of bypass switch operation showed noise spikes of a much lower amplitude.

4. The IRM spiking issue will be maintained on the "Plant Manager's Top Ten Issues" list for further corrective actions as necessary.

V. ADDITIONAL INFORMATION

A. Failed components: None

B. Previous similar events:

LER 91-08 "Reactor Scram due to Neutron Monitoring Trip While Performing a Controlled Shutdown"

LER 91-03 "Reactor Scram due to Spurious Trips of Neutron Monitor Caused by Noise and Inadequate Procedural Controls"

LER 90-19 "Reactor Scram due to Spurious Trip of Neutron Monitor Caused by Noise"

LER 87-25 "Reactor Scram due to Spurious Trip of Neutron Monitor Caused by Noise (cold shutdown)"

LER 87-16 "Reactor Scram, Turbine Trip, High Pressure Coolant Injection Mode of Feedwater Signals due to Spurious Trip of Neutron Monitor Caused by Noise (cold shutdown)"

LER 86-21 "Reactor Scram and HPCI Mode of Feedwater Initiation due to IRM Spike"

LER 84-05 "Scram Resulting from Spurious IRM Trips on Different

Channels of RPS"

The corrective actions of previous events resulted in the generation of a problem report. The following actions have been completed in an effort to mitigate spiking:

1. Ground straps have been added to each IRM/SRM chassis to ground.

2. Each IRM/SRM chassis was upgraded to include decoupling capacitors on the supply voltages to the monitor.

3. The instrument panel ground bus was separated from the remaining sections of the control room.

4. New cables were installed in the drywell using a new type connector under vessel. These new cables were installed in a stainless steel flexible conduit and grounded every 4 feet. The new cables were capacitively matched to the preamps.

5. Resistor-capacitive networks were installed across the bypass relays.

V. ADDITIONAL INFORMATION (cont.)

6. Varistors were installed across the rod control relays.

7. The drawers and preamps were verified to be operating correctly per the vendor.

8. Current/voltage (I/V) curves are being taken prior to shutdown, refuel and startup to find any detectors that may be susceptible to spiking.

9. New detectors were installed for IRM 12, 16, and 18 during refueling outage 12 in March/April 1993 (REFOUT12).

10. IRM 15 preamp was replaced during REFOUT12.

Niagara Mohawk is still actively pursuing corrective actions for IRM spiking problems. Past corrective actions have reduced the IRM spiking incidence. Ongoing problem identification and correction will strengthen the reliability of the system.

C. Identification of components referred to in this LER:

COMPONENT IEEE 803 EIIS FUNCTION IEEE 805 SYSTEM ID

Reactor Protection System N/A JC
Reactor Pressure Vessel N/A SJ
IRM Neutron Monitoring System N/A IG
Control Rod Position Indication N/A JD
IRM Channel MON IG
Bypass Switch HS IG
Bypass Relay Coil RLY IG
Trip Indicating Light IL IG

NIAGARA
MOHAWK

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Neil S. "Buzz" Carns
Vice President
Nuclear Generation

May 10, 1993
NMP88365

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

RE: Docket No. 50-220
LER 93-06

Gentlemen:

In accordance with 10 CFR 50.73 (a)(2)(iv), we are submitting LER 93-06, "Reactor Scram on Intermediate Range Monitor High Flux Caused by Spiking Electrical Noise."

A telephone report of this event was made in accordance with 10 CFR 50.72 (b)(2)(ii) at 1840 hours on April 13, 1993.

Very truly yours,

Mr. N. S. Carns
Vice President - Nuclear Generation

NSC/RLM/lmc

Attachment

xc: Mr. Thomas T. Martin, Regional Administrator Region I
Mr. Wayne L. Schmidt, Senior Resident Inspector

*** END OF DOCUMENT ***